EuropeAid

ENVIRONMENT & CLIMATE CHANGE

EC Cooperation:

Responding to climate change

Sector Script for Education

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This document was developed by EuropeAid in cooperation with DG RELEX, DG DEV and DG ENV with the support of the "environmental integration advisory services" project. It was designed to provide practical guidance on the links between climate change and a specific sector, together with possible responses to climate-related challenges. The purpose of this "script" is to support political dialogue on climate change implications between the European Commission, partner governments and other national partners involved in EC development and external cooperation activities, as well as to facilitate strengthened climate change integration in ongoing and future cooperation programmes and projects, with a focus on developmental benefits for the partner countries.

This sector script is one of a series prepared in a standard format. Scripts are available for the following topics:

- Introduction and Key Concepts
- Agriculture & Rural Development (incl. forestry, fisheries and food security)
- Ecosystems & Biodiversity Management
- Education
- Energy Supply
- Health
- Infrastructure (incl. transport)
- Solid Waste Management
- Trade & Investment (incl. technological development, employment and private sector development)
- Water Supply & Sanitation

Note that the script is not country or region-specific, and has been prepared to cover a wide range of possible effects and responses. Users are invited to appreciate which elements, among those proposed, are relevant to their specific needs and circumstances.

Note: Education has connections with practically all other sectors. All sector scripts contain proposed adaptation and mitigation measures the adoption of which could be fostered by awareness raising and capacity development in educational programmes. The text makes references to other related and complementary scripts.

Users of this script are advised to read it in conjunction with the Introduction and Key Concepts information note, which introduces the series and puts things in context.

Comments are welcome and can be addressed to the following e-mail:
EuropeAid-E6-natural-resources@ec.europa.eu
These documents can also be downloaded on the EuropeAid/E6 Intranet Pages.

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RESPONDING TO CLIMATE CHANGE: SECTOR SCRIPT

SECTOR: EDUCATION

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Climate change impacts on the education sector

Climate change may affect the education sector directly through the increased frequency and/or severity of extreme weather events, and perhaps even more so through a range of socio-economic impacts.

The increased frequency and/or severity of extreme weather events may lead to damage to educational infrastructure and other key infrastructure for the functioning of the education sector, resulting in temporary or more lasting disruption in the provision of educational services.

More indirectly but perhaps even more significantly, a series of socio-economic impacts of climate change may reduce educational achievements and the performance of the education system. Some impacts may lead to increased school dropout rates or an increase in the number of days children and teachers do not attend school: for instance, children may be required to spend more time fetching increasingly scarce water and fuelwood, or to assist in agricultural work or seek other work under conditions of reduced agricultural production / increased precariousness of livelihoods. The increased prevalence of malnutrition, which is known to impair concentration and learning capacity and, if suffered over long periods during childhood, to impair mental development, may adversely impact on children's performance at school. The increased morbidity caused by changes in water availability and quality, changes in the seasonality and range of disease vectors, etc. may both reduce school attendance by pupils and teachers and adversely impact children's and students' learning performance.

By exacerbating conflicts, climate change may also create conditions of insecurity in which the provision of educational services and/or school attendance become difficult or impossible. Finally, as a result of conflicts but also the increase in the frequency and/or intensity of extreme weather events and threats to rural livelihoods, climate change may increase rates of migration, especially rural-urban migrations. The resulting population increases in urban areas and in particular urban slums may put unbearable stress on already insufficient public education infrastructure and human resources.

Adapting to climate change

Most of the effects of climate change that act as threats to the education sector have to be addressed through actions in other sectors (e.g. health, water, agriculture, public infrastructure), so integrating climate change aspects in education involves providing inputs for other sectors' adaptation strategies. Still, some adaptation measures can also be adopted within the education sector itself:

- as far as infrastructure is concerned, possible measures include making educational infrastructure as "climate-resilient" as possible and, where power shortages are expected to become more frequent and electricity is essential to operations, investigating possibilities of reducing dependence on externally supplied energy;
- as far as school attendance and learning performance are concerned, possible measures under the control of education authorities include organising the provision of free school meals, developing basic medical surveillance and referral programmes in schools, and raising awareness of disease prevention and detection amongst schoolchildren and teachers;
- as far as the impacts of conflicts and migrations are concerned, specific efforts can be dedicated to strengthening the education sector's capacity to deliver basic schooling services in refugee camps, and also to adapt educational infrastructure and re-allocate human resources to keep up with changing demographic patterns.
- Contributing to climate change mitigation

The education sector is definitely not a big contributor to GHG emissions; accordingly, the sector's potential for contributing to climate change mitigation is rather limited. Some limited mitigation options nevertheless exist, for instance:

- improving the energy efficiency of education facilities;
- gradually opting for local power supply based on renewable energies to cover part of the energy needs of education facilities (which also ensures a minimum level of power availability during power cuts);
- and, where traffic to schools and other education facilities relies significantly on individual motor vehicles, developing public or collective transport and encouraging non-motorised means of transport.

Enabling response capacities for both adaptation and mitigation

The effects of climate change on a country can be diverse and adversely impact practically all sectors of activity. These expected effects will require a whole range of measures to adapt to the new conditions and contribute to the global mitigation effort without compromising development. The ability of partner countries to identify and then implement adaptation and mitigation strategies can be supported through awareness raising and capacity building actions in the education sector. For instance:

- awareness-raising on climate change and its expected effects can be integrated in school curricula at the different levels of education;
- vocational training could be supported to generate in-country capacities necessary to implement national adaptation and mitigation plans or strategies;
- post-graduate studies on climate change adaptation and mitigation could be developed; this would allow the creation of a pool of in-country expertise that would then be able to lead on the development of adaptation and mitigation strategies in a variety of sectors; such studies could also support the development of expertise for climate-related negotiations in international forums, and for making the best use of financing mechanisms available under the Kyoto protocol and its successor.

u How Climate Change might affect the education sector

Climate change may affect the education sector directly through the increased frequency and/or severity of extreme weather events, but even more significantly through a range of socio-economic impacts. The table below shows the main links between such impacts and the sector.

	Education
Biophysical effects	
Increase in extreme weather events / natural disasters	•
Socio-economic impacts	
Damage to infrastructure	•
Reduced availability of energy (hydropower)	•
Economic and social disruption, loss of livelihoods	•
Increased malnutrition	•
Increased mortality and morbidity[i]	•
Increased probability and intensity of conflicts	•
Population displacement and human migrations	•

[i] i.e. the frequency of occurrence and the prevalence of diseases.

1.1. DAMAGE TO INFRASTRUCTURE

As far as direct "physical" impacts are concerned, educational infrastructure may be damaged by the effects of extreme climatic events, resulting in temporary or more lasting disruption in the provision of educational services.

Other infrastructure considered essential for the functioning of the education sector, such as local transport, energy, water and sanitation, may also be damaged or temporarily disrupted by extreme weather events, also causing disruption in the functioning of education facilities and the delivery of educational services.

1.2. SCHOOL ATTENDANCE AND LEARNING PERFORMANCE

More indirectly but perhaps even more significantly, a series of socio-economic impacts of climate change impacts may reduce educational achievements and the performance of the education system. Some impacts may lead to increased school dropout rates or an increase in the number of days children and teachers do not attend school. For example:

- a decrease in water and fuelwood availability may cause children (especially girls) to spend more time in fetching these resources;
- children may be required to assist in agricultural work or seek other work under conditions of reduced agricultural

production / increased precariousness of livelihoods (due to effects such as an increase in the intensity/frequency of droughts, decreased water availability, reduced yields from fishing and aquaculture, reduced availability of forest products, etc. – see script on Agriculture & Rural Development);

- an increase in certain illnesses (e.g. waterborne diseases, vector diseases, food poisoning) resulting from higher temperatures and changes in rainfall patterns may lead to increased morbidity among children as well as teachers (see script on Health).

Some impacts of climate change may also have a negative impact on children's and students' learning performance, through:

- increased malnutrition due to reduced agricultural yields and the lower productivity of food production activities (see script on Agriculture & Rural Development); malnutrition is known to impair concentration and learning capacity and, if suffered over long periods during childhood, can impair mental development;
- the increased morbidity resulting from increased temperatures, changes in water availability and quality, changes in the seasonality and range of disease vectors, etc. (see script on Health).

1.3 CONFLICTS AND MIGRATIONS

By exacerbating conflicts, notably in relation to access to natural resources, climate change may create conditions of insecurity in which the provision of educational services and/or school attendance become difficult or impossible.

As a result of conflicts but also the increase in the frequency and/or intensity of extreme weather events and threats to rural livelihoods, climate change may increase rates of migration, especially rural-urban migrations. The resulting population increases in urban areas and in particular urban slums, especially if they occur over relatively short periods of time, may put unbearable stress on already insufficient public education infrastructure and human resources.

V ADAPTING TO CLIMATE CHANGE IN THE EDUCATION SECTOR

Most of the effects of climate change that act as threats to the education sector have to be addressed through actions in other sectors (e.g. health, water, agriculture, public infrastructure), so integrating climate change aspects in education involves providing inputs for other sectors' adaptation strategies. Still, some adaptation measures can also be adopted within the education sector itself. A few examples are provided below.

2.1. DAMAGE TO INFRASTRUCTURE

Possible adaptation measures include:

- gradually making educational infrastructure as "climate-resilient" as possible (including in the choice of locations for new infrastructure);
- where power shortages are expected to become more frequent and electricity is essential to operations (e.g. computer rooms, vocational training involving the use of machines), investigating possibilities of reducing dependence on externally supplied energy (e.g. through installation of local power generation equipment based on a renewable source).

In addition, any measures that make the public infrastructure on which the proper functioning of the sector depends (e.g. local transport, energy) more resilient to the effects of climate change should have a positive impact by protecting or improving the accessibility and operationality of schools. The implementation of these measures is besides the control of education authorities, however.

2.2. SCHOOL ATTENDANCE AND LEARNING PERFORMANCE

Possible adaptation measures under the control of education authorities include:

- where malnutrition is recognised as an issue, organising the provision of at least one free school meal per day;
- where increased morbidity is recognised as an issue, developing basic medical surveillance and referral programmes in schools, in partnership with local health authorities, and raising awareness of disease prevention and detection amongst schoolchildren and teachers (e.g. training on accessible malaria prevention techniques such as the adequate use of impregnated mosquito nets).

2.3. CONFLICTS AND MIGRATIONS

Possible adaptation measures under the control of education authorities include:

- strengthening the education sector's capacity to deliver basic schooling services in refugee camps, in situations of conflict- and climate-induced displacements of population;
- where significant migrations to certain areas are anticipated (e.g. migration from stricken rural areas into regional and national capital cities), gradually adapting educational infrastructure and re-allocating human resources to keep up with new demographic patterns (which requires continuous monitoring and regular updating of education maps).

W OPPORTUNITIES FOR REDUCING GHG EMISSIONS IN THE EDUCATION SECTOR

The education sector is definitely not a big contributor to greenhouse gas (GHG) emissions; accordingly, the sector's potential for contributing to climate change mitigation is rather limited. Some mitigation options nevertheless exist, for instance:

- improving the energy efficiency of education facilities;
- gradually opting for local power supply based on renewable energies to cover part of the energy needs of education facilities (which also ensures a minimum level of power availability during power cuts);
- where traffic to schools and other education facilities relies significantly on individual motor vehicles, developing public or collective transport and encouraging non-motorised means of transport.

X ENABLING RESPONSE CAPACITIES FOR BOTH ADAPTATION AND MITIGATION

The effects of climate change on a country can be diverse and adversely impact practically all sectors of activity. These expected effects will require a whole range of measures to adapt to the new conditions and contribute to the global mitigation effort without compromising development.

The ability of partner countries to identify and then implement adaptation strategies can be supported through awareness raising and capacity building actions in the education sector. As a matter of fact, the existing National Adaptation Programmes of Action (NAPAs) prepared by some countries under the United Nations Framework Convention for Climate Change (UNFCCC) often contain explicit or implicit references to including actions in the field of education in their adaptation strategies, which shows the relevance and importance of this sector to address the challenges of climate change.

In a similar manner, the sector can make a decisive contribution to a country's participation in the global climate change mitigation effort, and improve its ability to capture the financing opportunities associated with the development of emission reduction schemes and carbon markets. Some examples of possible actions in the education sector are provided below.

4.1. AWARENESS-RAISING ON CLIMATE CHANGE IN SCHOOLS

Awareness-raising on climate change and its expected effects can be integrated in school curricula at the different levels of education. For instance, school programmes could address the theme of climate change, as well as the concepts of adaptation and mitigation, in relation to environmental education and sustainable management of natural resources. Aspects of prevention, preparedness and disaster risk reduction could be taught both in primary and in secondary schools – and further on in higher education. This would ensure that the population is aware of the challenges, and therefore more motivated and capable to take appropriate adaptation and mitigation measures in the areas that concern them, within the range of their possibilities.

4.2. VOCATIONAL TRAINING AND IN-JOB TRAINING

Vocational training could be supported to generate in-country capacities necessary to implement national adaptation and mitigation plans or strategies. These could include, for example, the development of capacities for:

- the monitoring of key climate change variables;
- the control of new (human and animal) disease vectors;
- epidemiological surveillance (emergence of new diseases, increased incidence of existing ones such as malaria, cholera, yellow fever, …);
- the control of insect outbreaks;
- the introduction of new agricultural practices and crops;
- the development and maintenance of water-efficient irrigation schemes;
- the design and implementation of erosion control measures;
- the sustainable management of forests and protected areas;
- the development and maintenance of renewable energy infrastructure;
- the improved management of waste;
- improved land use planning and management.

Capacity needs assessment for the implementation of NAPAs or climate change response strategies may be necessary to design effective training programmes that meet a country's specific needs.

4.3. POST-GRADUATE STUDIES

Post-graduate studies on climate change adaptation and mitigation could be developed. This would allow the creation of a pool of in-country expertise that would then be able to lead on the development of adaptation and mitigation strategies in a variety of sectors. Such studies could also address the creation of expertise on the policy dimension of climate change (e.g. expertise for climate-related negotiations in international forums) and for making the best use of financing mechanisms available under the Kyoto protocol (e.g. Clean Development Mechanism) and its successor

y ILLUSTRATIVE EXAMPLES

Illustrative example 1: Malaria and the FRESH programme

Malaria is a disease that has an important impact on the education of schoolchildren, particularly in sub-Saharan Africa. Children are especially vulnerable to the disease, which kills many before the age of five. Those children who survive a bout of severe malaria may suffer brain damage or see their learning capacity impaired. Malaria can also reduce children's ability to attend school in more indirect ways: for instance, when other members of the family fall ill, girls in particular may be kept at home to take care of them and attend to domestic chores. In Kenya for example, it is estimated that malaria causes a loss of 1-6 million schooldays annually, and that it is responsible for up to 50% of all absenteeism due to ill health.

Climate change may affect the transmission of malaria, for example if temperature increases in regions where vectors are present but it is currently too cold for transmission. According to the IPCC's Fourth Assessment report (2007), estimates for changes in malaria transmission due to climate change vary according to the climate change scenarios and geographical regions, with up to 400 million additional people at risk globally. Increases are mainly foreseen in highlands and for countries close to the climatic thresholds.

Schools are one of the possible entry points for malaria control, through the education of children but also through their use as community centres and by hosting adult education programmes. The UNESCO-supported FRESH (Focusing Resources on Effective School Health) Programme, for instance, illustrates how malaria control can be supported by education-based initiatives. The FRESH programme supports:

- the adoption of coherent school health policies (e.g. reduction of mosquito-breeding spots on school grounds, referral of children and students with symptoms of malaria to local health services);
- the development of safe and secure learning environments (e.g. protection from mosquitoes in the school environment, especially if evening classes are organised);
- the development of skills-based health education (e.g. education on how malaria is spread, how to prevent it, how to diagnose and treat it, how to help a person with a fever);
- and the provision of school-based health and nutrition services (e.g. provision of malaria treatment and/or referral services; more indirectly, the provision of a balanced and possibly micronutrient-enriched school meals coupled with de-worming can contribute to strengthening children's and students' immune systems and thus their capacity to cope with disease).

Initiatives to deal with malaria through education could be extended to all regions at risk of increased malaria transmission or more severe malaria epidemics due to climate change, with a particular emphasis on prevention for those areas where malaria prevalence is still low but expected to increase.

Illustrative example 2: Impacts of floods on education in Cambodia

Floods are one of the main natural hazards to which Cambodia is exposed, occurring mainly in the alluvial plains of the Mekong river and its tributaries. They have a huge impact on children and education, through drowning of children, damage to educational facilities, and loss of school days. Over the past 70 years, 347 fatalities were registered, 80% of which were children. Like other infrastructure, schools located in flood-prone areas suffer serious damage. Moreover, most of the flooding usually takes place at the beginning of the academic year, and recurrent floods have been identified as one of the factors that disrupt the accomplishment of the study programme – with adverse impacts on the overall quality of education in Cambodia.

School drop-out and absenteeism have been shown to be higher in flood-prone areas. During floods, travel to school is more difficult due to road damage and difficulties in crossing rivers. Many children and students normally travel on foot or by bicycle; during floods they have to travel by boat, which makes it more expensive and discourages those who cannot afford the higher expense. Furthermore, in some areas schools have to close for at least 2 weeks and up to 2.5 months per year due to flooding. Although it is claimed by school directors that study programmes are completed, prolonged disruptions affect the quality of education, which tends to be lower in flood-prone areas compared to other regions of the country; the completion of programmes may be achieved at the expense of sacrificing the "less important" subjects.

School buildings are also affected by flooding; in the 2000 flood, for instance, at least 1,000 schools were destroyed, representing about 18% of the total, and about half a million primary and secondary school children were affected. Rehabilitation costs amounted to 16.8 million USD. Other damage is caused by the use of schools as emergency shelters, especially when cattle and pigs are brought into the schools for shelter.

The National Adaptation Programme of Action to Climate Change of Cambodia (2006) states that frequency and intensity of floods is expected to increase, and damage caused by floods is exacerbated by deforestation. Recommendations made for integrating Disaster Risk Reduction (DRR) in the education sector are increasingly urgent. These notably include:

- the integration of a "safer construction of school buildings" component, and more generally of DRR concerns, into the Education Strategic Plan;
- the issuing of construction guidelines and building codes for school buildings that integrate DRR – including training and capacity building measures for the staff of contractors and the authorities in charge of supervising works;
- a more careful choice of sites for new school construction;
- the integration of DRR into school curricula at all levels;
- and the training of teachers to implement the DRR components of curricula and emergency planning in schools.

Disaster risk reduction is an important element of the adaptive response to climate change – and in many countries that are regularly affected by natural disasters, it should provide benefits regardless of the ultimate magnitude of climate change effects. All sectors are concerned, including education which can take measures to improve its own resilience while contributing to awareness raising and capacity building in other sectors. The approach described here is one that could be replicated in many other countries.

Illustrative example 3: Support to educational components of NAPAs

The National Adaptation Programmes of Action (NAPAs) prepared under the United Nations Framework Convention for Climate Change (UNFCCC) present an analysis of the expected effects of climate change in the different countries and define priority adaptation projects. All of the NAPAs submitted so far propose projects that contain elements of capacity building and awareness raising (e.g. for introduction of new agricultural techniques, for monitoring of critical climate change variables).

Some NAPAs also have education-specific components. Some consider the integration of climate change in the education curricula, for example in Bangladesh (at secondary and tertiary educational institutions); in Ethiopia, the NAPA considers a capacity building programme for climate change adaptation, which includes specialisation at higher levels (e.g. MSc, PhD) in relevant climate change areas; in Lesotho, it advocates the inclusion of climate change in the curriculum at the different levels of education as part of the project on "capacity building and policy reform to integrate climate change in sectoral development plans"; in RDC, education-related activities are planned as part of the project for conservation and management of biodiversity in a mangrove marine park. Other NAPAs consider more general environmental education and awareness raising components, such as those for Guinea Bissau (environmental education and communication component in its coastal areas project), Mali (project on awareness raising of the population for the conservation of natural resources, including an environmental education component), and Senegal (environmental awareness raising of the population). Thus involvement of the education sector can be important for the effective implementation of NAPAs.

Z ILLUSTRATION OF LINKAGES

Below are a few illustrations (in a format that was voluntarily kept simple[1]) of the linkages between biophysical effects of climate change, potential socio-economic consequences and possible responses. They are provided to help visualize some important cause-effect relationships and how adaptive responses relate to the identified manifestations and impacts of climate change.

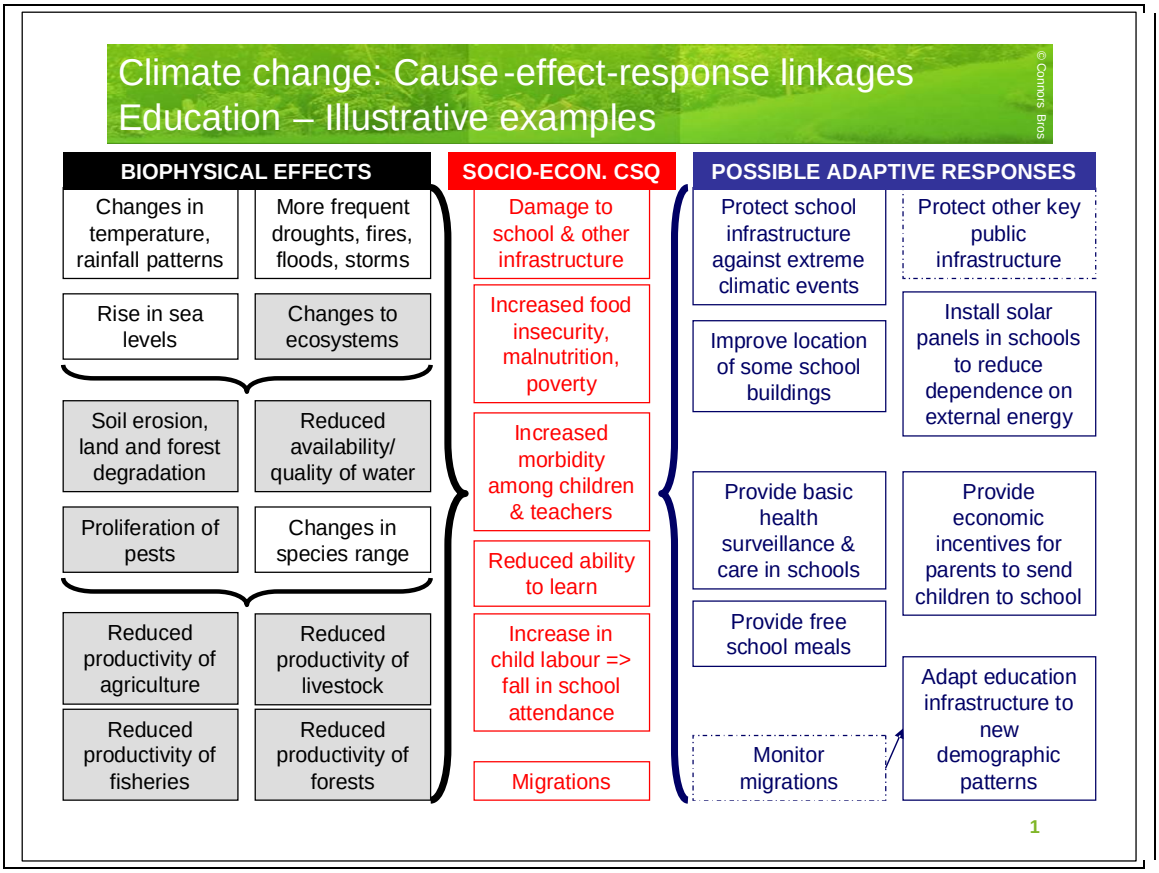
Legend:

Changes to ecosystems

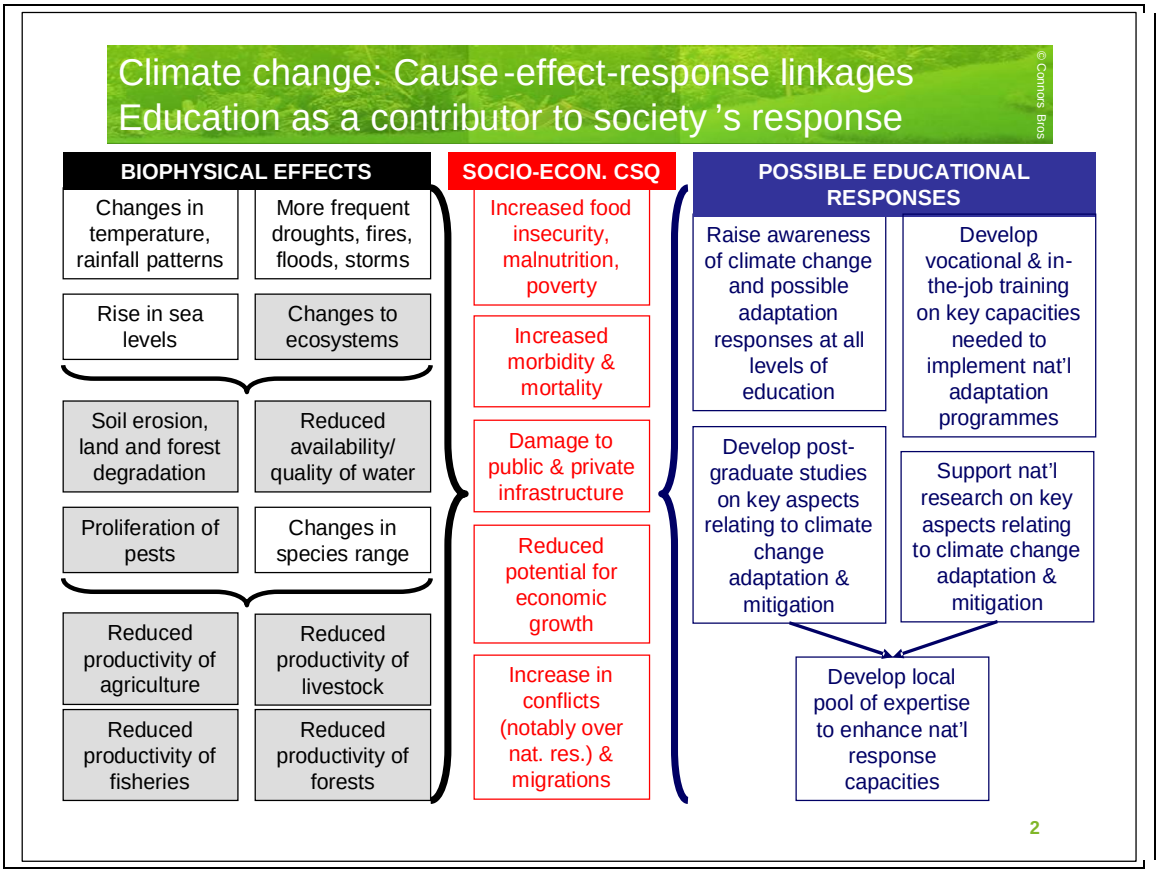
Grey boxes show biophysical impacts that are not exclusively or even primarily caused by climate change – but are also significantly influenced by other pressures resulting from human activities.

Develop migration & conflict management capacities

Boxes framed with a dotted line show possible responses that are in principle not under the direct control of the concerned sector authorities – but depend on the development of a cross-sectoral coordinated response.



[1] These illustrations are not meant to be comprehensive, or to be universally applicable; the simple format retained does not allow showing the multiple systemic interactions (including feedback loops) between various elements.


Climate change: Cause-effect-response linkages
Education as a contributor to society 's response
© Connors Bros
BIOPHYSICAL EFFECTS
Changes in temperature, rainfall patterns
More frequent droughts, fires, floods, storms
Rise in sea levels
Changes to ecosystems
Soil erosion, land and forest degradation
Reduced availability/ quality of water
Proliferation of pests
Changes in species range
Reduced productivity of agriculture
Reduced productivity of livestock
Reduced productivity of fisheries
Reduced productivity of forests
SOCIO-ECON. CSQ
Increased food insecurity, malnutrition, poverty
Increased morbidity & mortality
Damage to public & private infrastructure
Reduced potential for economic growth
Increase in conflicts (notably over nat. res.) & migrations
POSSIBLE EDUCATIONAL RESPONSES
Raise awareness of climate change and possible adaptation responses at all levels of education
Develop vocational & in-the-job training on key capacities needed to implement nat'l adaptation programmes
Develop post-graduate studies on key aspects relating to climate change adaptation & mitigation
Support nat'l research on key aspects relating to climate change adaptation & mitigation
Develop local pool of expertise to enhance nat'l response capacities
2

{ REFERENCES

General references:

(1) ADPC (2008) – Impacts of disasters on the education sector in Cambodia, Consultation version 1.1., Asian Disaster Preparedness Center. Available on: http://www.colorado.edu/hazards/ asia_disasters.html

(2) FRESH Programme website: http://portal.unesco.org/education/en/ev.phpURL_ID=34993&URL_DO=DO_TOPIC&URL_SECTION=201.html

(3) IPCC (2007) – Climate Change 2007 – Impacts, Adaptation and Vulnerability, contribution of Working Group II to the Fourth Assessment Report, Intergovernmental Panel on Climate Change/Cambridge University Press. Available on: http://www.ipcc.ch/ipccreports/assessments-reports.htm

Illustrative example 1:

(4) UNESCO education portal: http://portal.unesco.org/education/en/

(5) FRESH Programme website: http://portal.unesco.org/education/en/ev.phpURL_ID=34993&URL_DO=DO_TOPIC&URL_SECTION=201.html

Illustrative example 2:

(6) ADPC (2008) – Impacts of disasters on the education sector in Cambodia, Consultation version 1.1., Asian Disaster Preparedness Center. Available on: http://www.colorado.edu/hazards/asia_disasters.html

Illustrative example 3:

(7) NAPAs are available on the UNFCCC's website: http://unfccc.int

FURTHER INFORMATION AND SUPPORT

For further support in relation to the use of sector scripts, including the identification of sources of information on climate change projections in specific regions, you may contact the team in charge of providing advisory services for environmental integration in EC development/external co-operation:

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